PATENT SPECIFICATION

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DRAWINGS ATTACHED

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and ALFRED HOLBURT WARING

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COMPLETE SPECIFICATION

Improvements in or relating to Suspension for Model Road Vehicles

I, ALFRED HOLBURT WARING, a British Subject, of Landaras, Royston Grove, Hatch End, Middlesex, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the suspension of model or toy road vehicles, and is applicable, for example, to the suspension of model racing cars which are intended to travel around a track provided with guide channels for the cars. The grooves are intended to receive guide members projecting downwardly from the underside of the racing cars to effect steering thereof.

According to the present invention, a model road vehicle comprising a body, and front and rear axles, at least one of said axles being formed from a resilient material and being constructed or arranged to flex along its length in such a manner that the axle, and therefore road wheels mounted thereon, are vertically flexible but are relatively inflexible backwards or forwards relative to the vehicle body.

In order that the invention may be more readily understood, reference will now be made to the accompanying drawings in which:—

Figure 1 is an exploded perspective view of a front suspension of a model racing car, according to one embodiment of the invention;

Figure 2 is an exploded perspective view of the rear suspension of a model racing car, Figure 2 also showing an enlarged cross section of one bearing block;

Figure 3 is an exploded perspective view of the rear axle assembly of a toy or model car according to a second embodiment of the invention; and

Figure 4 is a partial vertical section on the axis of the rear axle of the car shown in Figure 3.

Referring to Figure 1, the front axle comprises an axle beam 1 moulded from nylon in the shape of a T. At the centre of the axle beam 1 the nylon is thickened to provide a boss 2 which is pressed or otherwise rigidly secured within a sleeve 3 integral with the model racing car chassis 4. The vertically extending limb of the T-shaped axle beam extends downwardly from the boss 2 and projects through the chassis 4 to form a fixed guide member which is engageable with a guide channel in the track (not shown). The horizontal limb 6 of the axle beam is thin in a vertical direction, but thick in a horizontal longitudinal direction, and is moulded at each end integrally with a lug 7 having aligned bosses 8 extending from the top and bottom surfaces thereof which constitute a king or swivel pin for nylon U-shaped stub-axle carriers 10. These bosses 8 are snapped through notches 9 into apertures 11 in the stub-axle carriers 10 which are thereby pivotally secured one to each end of the beam 1. Each carrier 10 is moulded integrally with a stub axle 12 on which a front wheel 13 is freely rotatable, the wheel 13 being retained on the axle 12 by a nylon or brass washer 14 which is fitted over a smaller diameter portion 15 of the stub axle 12, after which the outer end of this portion 15 is formed over, for example by heating it, to retain the washer 14 and therefore the wheel, on the axle 12.

The carriers 10 are also moulded integrally with forwardly and upwardly extending steering arms 16, which support and are interconnected by a resilient nylon track rod 17. This track rod 17, together with the axle beam 1, may be retained in place on the chassis by the body of the car when fixed to

the chasses so as to overlie the suspension. A downwardly projecting cylindrical stud 18, is moulded integrally with the centre of the track rod 17 and projects through an arcuate slot 19 in the chassis 4 to form a second guide member which is also engageable with the guide channel in the track. Movement of this stud 18 is transmitted to the track rod 17 which in turn varies the steering angle of the front wheels 13 of the racing car.

Since the front axle assembly is only secured to the chassis by the central boss 2, the axle beam 1 and the track rod 17 are free to flex vertically, thus providing resilient independent suspension between the car chassis and each front wheel. Due to the longitudinal thickness of the beam, flexing of the axle beam 1 and movement of the wheels backwards and forwards is prevented.

Referring to Figure 2, the rear of the racing car is also provided with a form of independent suspension. This is achieved by mounting the rear wheels 19 at each end of a thin flexible axle 20, for example a nylon axle. This axle 20 is preferably moulded integrally with a crown wheel or contrate gear 21 through which the rear wheels 19 are driven by means of a pinion 28 carried by a drive shaft 29 in driving connection with the armature of an electric motor (not shown). The end 29a of the drive shaft 29, when the pinion 28 and gear 21 are in mesh, engages the side of a boss 30 integral with the axle 20 to laterally locate the axle 20 and maintain the pinion 28 and gear 21 in correct mesh when the car is in use. The axle 20 is supported towards its centre, adjacent the contrate gear 21 and the boss 30, from the chassis (not shown) in bearing blocks 23 rigidly secured to the chassis. Each block 23, which may be molded at 24 to resemble a vehicle suspension unit, is provided with a passage 25 therethrough having a circular inner end 27 and a tapered outer end in the form of a vertical slot 26, the top and bottom surfaces of which diverge towards the rear wheel 19, within which the axle 20 may flex.

Thus, although the axle 20 is rotatable within the inner end 27 of each bearing block 23 with a minimum of radial movement, the portion of the axle disposed within the vertical slot 26 may flex vertically to provide independent resilient suspension between the car chassis and each rear wheel 19.

A simplified suspension is shown in Figures 3 and 4. In this embodiment, the car chassis 32 is provided with a peripheral upstanding flange 33, formed with a pair of upwardly opening U-shaped slots 34, the base surface of each of which is inclined or flared downwardly at 38 towards its outer end. Within the slots 34 is located a flexible axle 35, which may be a nylon rod or tube or a combination of the two, having a road wheel 36 secured to each end thereof.

The axle 35 is retained in the slots 34 by one or more, for example, a pair of axle engaging members in the form of studs or projections 37 secured to or integral with the inside of the body portion 31. These studs 37 bear on the upper surface of the part of the axle positioned between and adjacent the slots 34, when the body and chassis portions are assembled together.

The slots 34 prevent the axle 35 from moving backwards or forwards in the direction of travel of the car, and, together with the studs 37, prevent bodily vertical movement of the axle whilst permitting rotation thereof. However, since the studs 37 are positioned between the slots 34 and the base surfaces of the slots 34 are flared towards their outer ends, the outer ends of the axle are free to flex vertically therein about the studs 37. The car is thus provided with a form of independent suspension for each rear wheel.

The axle may be driven, in which case it may be provided with a contrate gear as shown in Figure 2, but alternatively it may be used in conjunction with an unpowered toy vehicle which is merely pushed along.

It will be understood that various modifications may be made without departing from the scope of the present invention. For example, the horizontal limb of the front axle beam shown in Figure 1 may be made from thin spring steel or brass instead of nylon, and the rear axle shown in Figures 2 to 4 and/or the front axle beam may be made from spring wire such as piano wire. The axles, on the other hand, may be moulded from a resilient synthetic plastic material other than nylon, or from a hard rubber.

Moreover, the flexibility of the front and rear suspensions shown in the various Figures may be altered by making the axle beam and the rear axle thicker or thinner. Alternatively, the rear suspension of Figure 2 may be stiffened by locating a spring in the vertical slot 26 above the axle, which is carried by each bearing block 23 and bears on the axle. Moreover, the lateral location of the axle may be effected by the inner ends of the bearing blocks instead of the pinion drive shaft.

The rear axle of Figures 2 to 4 may be formed from a tube of resilient material. A rigid rod may be inserted into each end or the centre thereof to stiffen portions of the tube. Alternatively, the rear axle may be formed from a solid rod which is bored axially at each end to form tubular portions. A rigid rod which is shorter than the tubular portion is inserted into each tubular portion so that a space is formed between the inner end of each tubular portion and the inner end of its associated rod. The tubular portion defined by this space is the most flexible part of the axle, and the axle therefore flexes about this portion to provide the resilient suspension. The preceding constructions have the advan-

tage that the tendency of the wheels to move backwards and forwards is reduced.

Furthermore, the suspension hereinbefore described may be applied to model cars other than racing cars used on a track, for example to cars which are not steerable and are propelled merely by pushing by hand.

WHAT I CLAIM IS:—

1. A model road vehicle comprising a body, and front and rear axles, at least one of said axles being formed from a resilient material and being constructed or arranged to flex along its length in such a manner that the axle, and therefore road wheels mounted thereon, are vertically flexible but are relatively inflexible backwards or forwards relative to the vehicle body.

2. A vehicle as claimed in claim 1, including first means locating said axle against vertical and backwards and forwards movement, and supporting said axle towards the centre thereof, and second means locating said axle against backwards and forwards movement only, disposed between said first means and the road wheels.

3. A vehicle as claimed in claim 2, including a pair of bearing blocks each having a transverse passage extending therethrough and secured one adjacent each side of the body, with the axle extending through, and located and rotatable in the passages in the two blocks, the inner ends of the passages which face towards one another being circular and of a diameter slightly greater than the diameter of the axle to permit free rotation but limit radial movement of the axle, and the outer ends of the passages comprising vertical slots within which the axle is free to flex only vertically.

4. A vehicle as claimed in claim 3, wherein the blocks are moulded from a synthetic plastic material.

5. A vehicle as claimed in claim 3 or 4, wherein a spring is positioned within each vertical slot, which acts on the axle to increase the resistance to vertical flexing thereof.

6. A vehicle as claimed in claim 2, wherein said body includes a body portion and a chassis portion assembled together, said chassis portion having a pair of upwardly opening U-shaped slots adjacent opposite sides thereof, within which the axle is rotatably located, and bosses depending from the body portion into or adjacent the inner end of each slot to engage the top of the axle to form with said inner end said first means, the outer end of each slot constituting said second means.

7. A vehicle as claimed in claim 6, wherein the outer end of the bottom of each slot is downwardly flared.

8. A vehicle as claimed in claim 2, wherein said axle comprises a non-rotatable beam of resilient material secured at its centre to the body, said beam being thinner in a vertical direction than in a longitudinal direction, whereby said beam is flexible vertically but not horizontally.

9. A model road vehicle comprising a body portion, a chassis portion and front and rear axle assemblies carried by said portions, at least one of said axle assemblies being flexible along its length, being located in each side of said chassis portion against backward and forward flexing, but not against vertical flexing, and being located by the body portion, intermediate the sides of the chassis portion, against bodily vertical movement.

10. A vehicle as claimed in any preceding claim, wherein the axle is a rod of resilient synthetic plastic material.

11. A vehicle as claimed in any preceding claim, wherein the axle is tubular or part tubular.

12. A vehicle as claimed in claim 11, wherein at least one rigid member is inserted into at least a part of the tubular interior of the axle to rigidify said part.

13. A model road vehicle constructed substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings.

14. A model road vehicle constructed substantially as hereinbefore described with reference to Figure 2 of the accompanying drawings.

15. A model road vehicle constructed substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.

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990585 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 1 & 2

Fig.1

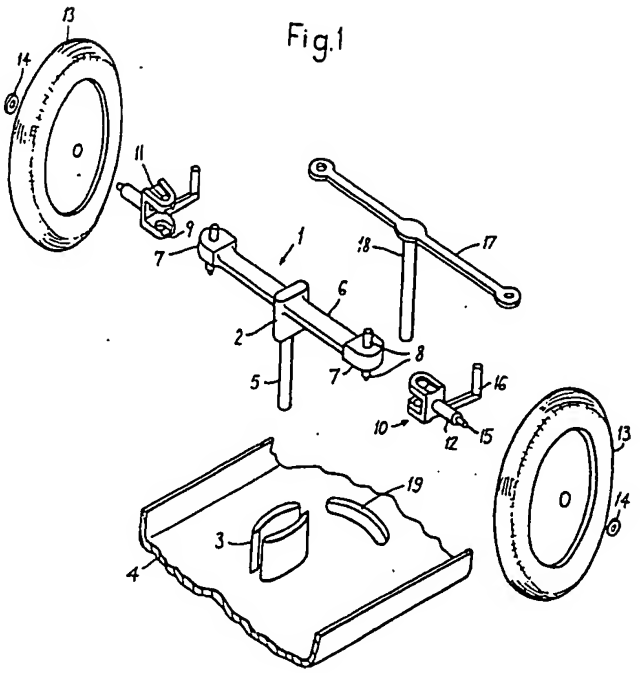
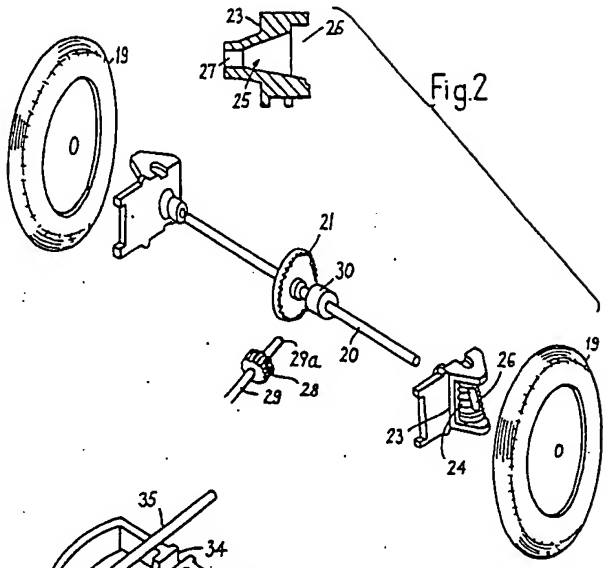


Fig.2



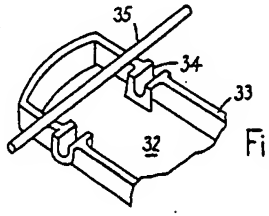


Fig.3

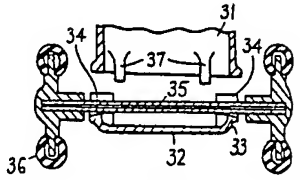


Fig.4